Claims

1. A method of carrying out working steps on miniaturised modules, which are held by a module carrier provided with a holding device, in at least one work station,
characterised in that, for the purposes of carrying out the working steps, the module is moved by one of the module carriers to a plurality of work stations and is precisely positioned for carrying out one of the working steps by means of a relative movement between the module carrier and the currently relevant one of the plurality of workstations, and in that the positioning of the module relative to the module carrier is maintained for carrying out the working steps.

2. A method in accordance with Claim 1, characterised in that the module continues to be held by the holding device in the module carrier whilst carrying out a sequence of working steps.

3. A method in accordance with Claim 2, characterised in that the sequence of working steps is effected in a mechanically non-contact making manner.

4. A method in accordance with Claim 3, characterised in that the working steps are carried out by means of electromagnetic radiation.

5. A method in accordance with any of the preceding Claims, characterised in that a process of fine positioning the module is carried out as one of the working steps.

6. A method in accordance with Claim 5, characterised in that an exact position of the module relative to the module carrier is determined during the fine positioning working step and in that this position is made available for the subsequent working steps.

7. A method in accordance with any of the preceding Claims, characterised in that a controlled relative positioning between the module carrier and the work station is carried out in each work station, this being effected by positioning elements disposed thereat.

8. A method in accordance with any of the preceding Claims, characterised in that exclusively non-contact making working steps are carried out in one of the work stations.

9. A method in accordance with Claim 8, characterised in that each of the non-contact making working steps is carried out by means of electromagnetic radiation.

10. A method in accordance with Claim 9, characterised in that each working step is carried out with substantially spatially uniform energy density distribution.

11. A method in accordance with Claim 9, characterised in that each working step is carried out by means of laser radiation.

12. A method in accordance with Claim 11, characterised in that a beam profile of the laser beam is rectangular or square.

13. A method in accordance with Claim 11 or 12, characterised in that each working step is carried out by means of pulsed laser radiation.

14. A method in accordance with any of the preceding Claims, characterised in that a process of applying a layer to the module is carried out by means of laser radiation in one of the work stations.

15. A method in accordance with any of the preceding Claims, characterised in that a process of removing material from the module is carried out by means of laser radiation in one of the work stations.

16. A method in accordance with any of the preceding Claims, characterised in that a jointed connection to the module is produced by means of a process of supplying energy by electromagnetic radiation in one of the workstations.

17. A method in accordance with any of the preceding Claims, characterised in that a module carrier is moved from one work station to another in correspondence with a defined sequence.

18. A method in accordance with Claim 17, characterised in that a plurality of module carriers co-operate simultaneously with respective ones of the plurality of work stations.

19. A method in accordance with Claim 17 or 18, characterised in that the module carriers are movable relative to a base unit.

20. A method in accordance with Claim 19, characterised in that the module carriers can be moved along arbitrary predefined paths on the base unit.

21. A method in accordance with any of the preceding Claims, characterised in that the module carriers are supplied with control information in non-contact making manner.

22. A method in accordance with Claim 21, characterised in that the positioning of the module carriers is controlled in non-contact making manner.

23. A method in accordance with any of the preceding Claims, characterised in that the module carriers are supplied with energy in non-contact making manner.

24. A method in accordance with any of the preceding Claims, characterised in that the module carriers transfer test data in non-contact making manner.

25. A device for carrying out working steps on miniaturised modules, especially in accordance with any of Claims 1 to 21, comprising a module carrier provided with a holding device for holding the modules and a work station for carrying out at least one working step, characterised in that there are provided a plurality of work stations (22, 24, 26, 28, 30), in that the module carrier (20) is movable in such a manner that the module (40) is precisely positionable by virtue of a relative movement of the module carrier (20) and the work station (22, 24, 26, 28, 13) for the purposes of carrying out the working steps in the plurality of work stations (22, 24, 26, 28, 30), and in that the module (40) is adapted to be fixed by the holding device (50) in a single relative position with respect to the module carrier (20) for carrying out the working steps.

26. A device in accordance with Claim 25, characterised in that the module (40) is adapted to be fixed on a gripper head (50) of the module carrier (20).

27. A device in accordance with Claim 25, characterised in that the gripper head (50) comprises a vacuum gripper (53) for the module (40).

28. A device in accordance with Claim 27, characterised in that a positioning device (68) for the module (40) is integrated in the vacuum gripper (53).

29. A device in accordance with Claim 28, characterised in that the positioning device (68) is formed such as to detect a marking (72) on the module (40) that is associated with a vacuum chamber (56) of the vacuum gripper (53).

30. A device in accordance with any of Claims 25 to 29, characterised in that the gripper head (50) and at least one of the work stations (24, 26, 28, 30) comprise mutually co-operating positioning elements (90, 140) with which the gripper head (50) is precisely positionable with respect to the work station (24, 26, 28, 30).

31. A device in accordance with any of Claims 25 to 30, characterised in that the module carrier (20) comprises a driver unit (102) with which it is movable relative to a base unit (10).

32. A device in accordance with any of Claims 25 to 31, characterised in that the module carrier (20) comprises a coupling unit (104) with which energy is adapted to be coupled into the module carrier (20).

33. A device in accordance with any of Claims 25 to 32, characterised in that the module carrier (20) comprises positioning units (108, 110, 112, 113, 114) with which the gripper head (50) is movable relative to a base element (46) of the module carrier (20).

34. A device in accordance with Claim 33, characterised in that the module carrier comprises the base element (46) and an extension arm (44) which supports the gripper head (50).

35. A device in accordance with any of Claims 25 to 34, characterised in that the module carrier (20) comprises a control system (120) with which the gripper head (50) is positionable.

36. A device in accordance with Claim 35, characterised in that the control system (120) communicates with an overall control system (130).

37. A device in accordance with Claim 36, characterised in that the control system (120) communicates with the overall control system (130) by means of a non-contact making transfer of information.

38. A device in accordance with any of Claims 25 to 37, characterised in that one of the work stations (26, 28) is provided with a source of laser radiation (106) with which the laser radiation (164, 212) that is required for carrying out the working step therein is producible.

39. A device in accordance with Claim 38, characterised in that the laser radiation emerges from an outlet opening (160, 210) which faces a module (40) positioned in this work station (26, 28).

40. A device in accordance with Claim 39, characterised in that an element (216) that is to be connected to the module (40) is positionable in one of the work stations (28) between the outlet opening (210) for the laser radiation (212) and the module (40).

41. A device in accordance with any of Claims 38 to 40, characterised in that the source of laser radiation (166) produces pulsed laser radiation.

42. A device in accordance with Claim 41, characterised in that the source of laser radiation (166) produces laser radiation (164, 212) having pulse durations in the pico-second range.

43. A device in accordance with Claim 41 or 42, characterised in that the source of laser radiation (166) produces pulses having a rectangular beam profile (182).